Ecodialysis: is it possible an eco-friendly system?

ECODIALYSIS: IS IT POSSIBLE TO DESIGN AN ECO-FRIENDLY SYSTEM?

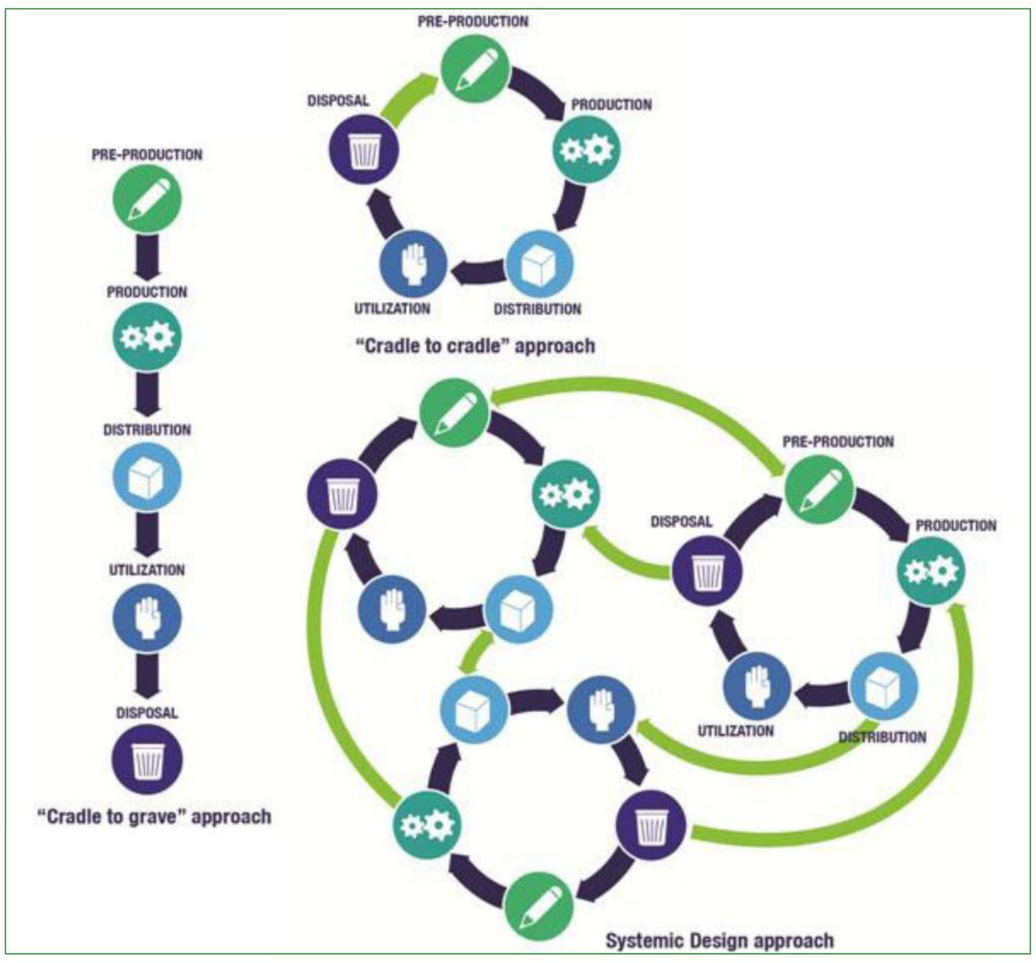
M. Ferraresi[1], A. Pereno[2], M. Nazha[1], S. Barbero[2], G.B. Piccoli[1]

[1]Department of Clinical and Biological Sciences, University of Torino, Turin, Italy; [2]Politecnico of Torino, Turin, Italy

OBJECTIVES

In medicine, attention to the environmental impact is still limited. Most of the analyses so far performed regard the last part of the cycle, the "grave of waste products". **Chronic Hemodialysis produces about 600,000 tons of plastic waste per year.** The economic crisis and the awareness of damage to the ecosystem progressively induced to focus attention on the lifespan of disposable, "from cradle to grave". A new outlook is presently focused on recycle, that is the subsequent start of new cycles leading to a **"from cradle to cradle"** model: allowing a "new life" for the waste products, despite the need for initial investment (Fig 1).

Aim of the present study is an analysis of the characteristics of the disposables employed in chronic hemodialysis, as a tool for identifying strategies limiting the environmental impact and containing the costs.



METHODS

Two teams composed respectively by **Nephrologists** of a recently established Dialysis Center and the **Systemic Design group** of Politecnico of Turin joined to solve the problem of hemodialysis waste. An analysis of the disposables employed on dialysis and of their "final destiny" (the grave) was performed in 3 subsequent **bicarbonate dialysis sessions with 3 different dialysis machines**. All disposables and packaging were photographed, classified weighted and analyzed as for type of materials, possibly to recycle, contamination with blood or biological fluids.

RESULTS

Each dialysis session produces between **4 and 6 kg of waste**: it may be divided into about 2 kg of residual fluids (to be discharged), 2 kg of "contaminated" wastes (i.e. In contact with blood or fluids) and 2 kg of "non contaminated" wastes. The differentiation is crucial, as the weight of contaminated waste products is the main determinant of disposal cost (approximately 2 Euros/kg in Italy).

Furthermore, each dialysis session produces between **0.9 and 1.4 of packaging** (cardboard and plastic); this is usually discharged separately, but where this procedure is not followed, it adds considerably to the volume and weight of the final wastes.

Therefore, a unindifferentiated waste collection may produce over 6 kg of waste products per session; the cost (up to 12-14 Euros) correspond to 20-40% of the cost of the disposables.

While all the cardboard and paper wastes are readily recyclable, the plastic wastes (non contaminated) can theoretically enter a dedicated recycle process. In this regard, the wastes may be classified into "families" of different plastic materials, with different compatibility for joint recycling. However, in most of the cases, **the types of plastic components are not identifiable and separable.**

Further problems are related with:

- **Packaging oversize**: the content of most of the packaging of dialysis materials occupies between 50 and 75% of the space, increasing costs (production, waste, transportation).
- **Difficulties in storage managing** in hospital warehouses, associated to the absence of clear information on the cardboard.
- **Emptying**: there are no automated systems for emptying residual fluids after the dialysis session, thus personal initiative of staff are needed.
- **Difficult separation of materials**: many packages are laminated composite materials made of different components and difficult to separate.
- **Difficult separation of contaminated material**: there is no clear definition of "contaminated".

CONCLUSIONS

Attention to the life cycle of the dialysis disposables may conjugate the attention to our planet, reducing the "mountain" of wastes produced every year; simple task, as **careful emptying and differentiating between "contaminated" and "non contaminated" wastes may lead to a 20% saving of the costs of a dialysis session**. Cooperation between sanitary operators and the Industry is needed for designing recycling strategies in keeping with the modern "crandle to crandle" approach.

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DOI: 10.3252/pso.eu.51era.2014